NOvA Construction Project

Requirements for Hardware Database Infrastructure and Support

Meeting date: Thursday 4/5/2012, 3:15 PM

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Notes from the meeting

We discussed the procedures for validating and recording NOvA detector modules as they are transported from the PVC Factory (PVCFactory), to the factory at U. Minn (UMFactory), and then to the Ash River construction site (ARSite). The goal of the meeting was to understand the use cases, and identify the requirements for the construction database infrastructure and support.

Each major site of operation has a database used to record measurement and test information about components and modules as they are produced/assembled. There is a postgress database maintained at Fermilab, the Fermilab Hardware Database (FHWDB), into which all the hardware information is added for the basic modules and components prior to assembly. The UMFactory has a "construction" DB (UMDB) that stores the data obtained for the factory module construction and testing operation. The UMDB system employs a Java application to make tables used for everything needed for construction at UMFactory. The ARSite will have a "construction" DB (ARDB) used to evaluate modules ready for integration in to the detector and record additional test information. The ARDB system is under development but will be ready prior to the beginning of the Ash River construction operations.

One additional note, the schema and use pattern of the database at ARSite is still being developed, and will be very dynamic early on. It certainly would be easier if all the databases at all the sites had the same schema and this may ultimately be worked out, but it is currently not the case. However, in the short term making the browsing tools flexible enough to accommodate the differences would be very useful.

Step 1: Modules transported from extruder to U. Minn. Factory

The UMFactory runs a check of parameters in the FHWDB to determine which modules will be shipped from the PVCFactory to the UMFactory. They pull the info for the modules being shipped into their UMFactory DB. If they were unable to connect to the Fermilab DB they could continue, however if some of the modules shipped did not meet the required specs they would need to be returned to the PVCFactory.

Risks: 1. Network outage between Fermilab and UMinn factory site. 2. Fermilab HWDB is unavailable, 3. UMDB is unavailable.

Requirements: 1. The Fermilab HWDB must be available for module screening prior to shipping, 2. Alex would like it be a requirement that he can add tables and relationships to his UMDB schema whenever he feels they are necessary.

Discussion: If the network is down, or the FHWDB is otherwise unavailable prior to shipping, it is possible some modules would be shipped that are below spec. The UMDB has a redundant server that has a replica database. The replication is accomplished using features in Postgress 9.1. These databases are also fully backed up. This protects them from losing information and avoids downtime if the primary server has any problems.

Step 2: Completed modules shipped from U. Minn to Ash River Site and tested

Personnel at the ARSite will do pre-checking before the modules ship from UMFactory, so they will need to have access to the UMDB prior to shipping. It is likely that shipments from UMFactory will be occur early in the day and be prepared/collected late on the previous day. When modules are delivered to the ARSite they are re-evaluated by performing pressure and fibre tests. These test results will be loaded in to the local DB (ARDB), compared with the results from UMDB pulled over previously, and validated for installation in the detector.

Risks: 1. Network between UMFactory and ARSite is down, 2. UMDB server is unavailable, 3. ARDB server is unavailable.

Requirements: 1. Data for shipped modules from UMFactory must be available when the modules arrive at ARSite. 2. ARDB server must be available during ARSite module testing prior to their installation on the detector.

Discussion: To allow for the network being down when the modules are shipped, an alternative method for transferring the data should be developed. We discussed sending a thumb drive along with the modules when they are shipped. Support for servers and DB software from Fermilab will be limited to business hours (M-F 8-5), and critical use of the ARDB should take this into account. This means that information needed by the construction crews during off hours should have an alternative source, such as a copy on another computer or a printed copy.

There is a 3-day turn around for any hardware problem with the servers due to the round-trip time from ARSite to Fermilab. Therefore there needs to be sufficient redundancy and spares at ARSite to avoid lengthy downtimes. The database is currently running under a VM located on a server maintained by Fermilab Experiment Facilities (FEF). It was suggested that the current VM should be replaced with two physical servers, or equivalent, to provide the required availability.

Step 3: Modules are installed, and construction status accessed by Fermilab

After each module is installed, it will be recorded in the ARDB with some parameters (TBD). This information will be accessed by the NOvA Construction project at Fermilab to evaluate construction progress. This access will occur about once each day, but is not critical if there were a network outage for some period of time.

Risks: 1. Network between ARSite and Fermilab is down, 2. ARDB is down.

Requirements: 1. ARDB server must be available for entering module post-installation data, 2. The status of the module installation should be available for evaluation by ARSite and Fermilab on a daily basis.

Discussion: If there were an extended network outage (few hours to a few days) it would NOT be considered a critical failure. An alternative method for transmitting this information to Fermilab should be arranged in the, hopefully rare, case this occurs.